

Necessarily there has been some differences of opinion, and what has been found true in one place has been denied elsewhere. This is not remarkable if one considers how much mosquito life and habits are influenced by meteorological factors, and these obviously differ greatly in different latitudes and at different altitudes. On certain essential points, however, all observers are agreed: malaria is caused by three (possibly four) species of the *Hæmaphysidæ*, and these are indisputably conveyed from man to man by mosquitoes of genus *Anopheles*.

Another important point has been noted in West Africa by Stephens and Christophers and by Koch in Java and elsewhere. Native children of one to three years old are peculiarly the victims of malaria parasites, and as they grow older the invasion by parasites becomes less and less. These facts have been taken to prove what has long been asserted, viz., that prolonged residence in a malarial country produces a relative amount of immunity.

Koch used the presence or absence of parasites in the blood of young children as a criterion of the question as to whether malaria was endemic or merely imported. It further shows how great a danger to white men is living in close proximity to native habitations. This has been insisted on in West Africa, much to the indignation of the educated blacks.

Incidentally, additions to our knowledge of the fauna of West Africa have been made by these expeditions. Mr. Ernest Austen, of the Zoological Department, British Museum, accompanied the first expedition to Sierra Leone, and a report on his work there has been recently published by the authorities of the museum.

Fifteen hundred specimens of insects were obtained, chiefly of the Lepidoptera, Diptera and Neuroptera, though four other orders were represented in the collection. In his report Mr. Austen describes a variety of Tsetse fly (*Glossina longipalpis*), and a Muscid (probably new) known locally as the "Tumba" fly. The latter deposits its egg under the skin of man and other animals, and when the larva is hatched a boil of a peculiarly painful character is produced. The departure of Mr. Austen, immediately on his return from Sierra Leone, to South Africa with the City Imperial Volunteers has prevented us as yet of obtaining the full fruits of his work, which, now that he has safely returned, we shall eagerly look for.

The best methods of malaria prophylaxis have been much discussed. The original views of Major Ross and the first Liverpool expedition, in the light of wider and more recent knowledge, seem somewhat too sanguine. The destruction and extermination of mosquitoes by drainage and the use of culicicides, as suggested in their report, is now regarded as impracticable in some districts, although in many places these methods, in conjunction with the intelligent use of mosquito-curtains and quinine, could not fail to bring about a marked improvement.

On the whole, however, we must rely, as Dr. Manson has insisted, on the prolonged treatment of patients with quinine and during the time they have parasites in their blood on their rigorous isolation and protection from mosquitoes.

Paradoxical as it may seem, we must first aim at preserving mosquitoes from infection and so limit the chances of the dissemination of the parasites as far as possible.

It cannot be too strongly emphasised that in a malarious country where *Anopheles* are present a case of fever is infectious.

The value of the proper use of mosquito netting is strikingly shown by the following experiments. In March last Dr. Manson, speaking at the Colonial Institute, announced that the Colonial Office, in conjunction with

the London School of Tropical Medicine, had authorised him to make an experiment to show the practicability of preventing malaria by easily applied means. A hut was to be erected in the most malarious part of the Roman Campagna with wire gauze doors and windows so as to render it mosquito proof. This hut two skilled observers were to occupy from May to October, that is, during the whole malarial season. By day they would be able to go out, but at sunset, before the mosquitoes rose, they were to enter their hut and remain closed in until daybreak. By this means it was contended they would be free from all possibility of infection by mosquitoes. In accordance with this plan Drs. Low and Sambon, of London, took up their residence in June, and the latest information is that they have passed through a trying ordeal unscathed and without any appearance of fever. This experiment is of great value, though open to criticism on the grounds that the conditions are somewhat artificial.

A similar experiment, under more natural conditions, and therefore, perhaps, of a more searching character, has been tried by the members of the second Liverpool expedition to West Africa. For four months, in the most malarious districts on the Niger, Drs. Annett, Dutton and Elliott have lived, relying, not on quinine, but only on their proper use of mosquito curtains. A recent communication shows that they have retained their health throughout their stay.

Another important experiment has recently been tried, an experiment which may be considered the complement of those just mentioned.

A consignment of *Anopheles*, fed on the blood of a patient in Rome known to contain parasites, was received in London from Prof. Bastianelli in July last. A son of Dr. Manson, who had not been in a malarious country since childhood, submitted himself to the bites of these infected mosquitoes. Within a fortnight Mr. Manson had a typical attack of fever, and in his blood were found parasites similar to those causing the fever of the Roman patient on whom the mosquitoes had originally been fed.

This is a crucial experiment, and proves to the hilt, if further proof were needed, that malaria is conveyed by mosquitoes from man to man. Similar "feeding" experiments had been done before, but never has such a striking and satisfactory demonstration been obtained. We have now to deal no longer with theories, but with facts, and it remains to put into practice the valuable information we have obtained as to the possibility of limiting malaria, and so improve the sanitary condition, and thereby increase the commercial prosperity of many of our greatest colonies.

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THE GEOLOGICAL SURVEY OF GREAT BRITAIN AND IRELAND.¹

THE summary of progress of the Geological Survey of the United Kingdom for the year 1899 has been issued by Sir Archibald Geikie, Director-General. The field-work was carried out in England and Wales principally in the coal districts and bordering tracts of North Staffordshire, Leicestershire and Glamorganshire; in the slate and granite areas of Cornwall; and in the Cretaceous and Tertiary regions of the southern and southern-midland counties. In Scotland the survey of the Highland regions was prosecuted as vigorously as the nature of the ground permitted, and progress was also made in the surveys of Arran and Skye. In Ireland the revision of Silurian areas was continued.

The bulk of the summary is taken up with a somewhat detailed record of the observations made in the field; and

¹ "Summary of Progress of the Geological Survey of the United Kingdom for 1899." Pp. v + 214. (London: Printed for H.M. Stationery Office, 1900.)

this is supplemented by an account of work done in the petrographical and palaeontological departments of the Survey. The field record is arranged stratigraphically, beginning with the pre-Cambrian rocks and ending with the recent deposits. Thus there are notes on nearly all the main geological systems, excepting only the Cambrian, Permian, and some of the Tertiary divisions.

In the accounts of Highland regions we find many references to the complex folds, the faults and thrust planes, which have affected the Lewisian gneiss, the schists of the "Moine series," the Torridonian and other rocks. In some cases highly altered rocks are found to overlie others which are less altered, showing that the metamorphism must have taken place before the rocks occupied their present relative positions. In places the Moine rocks contain intrusions of partially foliated hornblende rocks, and some of these are foliated parallel to their sides and cut both the banding and the foliation of the rocks in which they occur.

It seems probable that the Moine schists of the north-west pass into and form part of the Dalradian series of the central Highlands. It is also considered probable that the Moine schists acquired their present crystalline characters since Cambrian times. Moreover, from the fact that the phyllites, quartzites, grits, conglomerates and limestones which extend from the shores of Elgin, Banff and Aberdeen to those of Islay and Jura have had a sedimentary origin, it is thought that they may yet find a definite place among pre-Cambrian or even post-Cambrian formations. In connection with this subject it is to be remembered that a belt of rocks, possibly of Arenig age, has been traced at intervals from Kincardineshire to Dumbartonshire. Here the rocks are wedged in along a line of disturbance between the Highland schists and the Old Red Sandstone; and they comprise graphitic shales, schists and cherts with Radiolaria. Rocks of this character have now been discovered in Arran.

Another interesting discovery is chronicled in the account of the work among the Silurian rocks of Ireland. The majority of the igneous rocks of the Waterford coast have been regarded as volcanic sheets intercalated contemporaneously among the Lower Silurian sediments. Evidence is now brought forward to show that these rocks, which were believed to be tufts and agglomerates, are intrusive, the "agglomerates" having been in reality produced by a process of brecciation during a prolonged period of igneous intrusion.

It has been pointed out in a previous issue of the "Summary of Progress," that the detailed study of the rocks in the North Staffordshire Coal-field has shown that the coal-measures extend over a much wider area at or near the surface than was previously thought. Evidence furnished by a bore-hole at Thurgarton near Nottingham confirms the persistence and importance of the subdivisions that have been recognised and mapped in the North Staffordshire coalfield.

Much new information has also been gathered in the great Coal-field of South Wales, and some remarkable disturbances accompanied by over-thrusting are figured. Interesting also are the observations which have been made on the secondary rocks in this coal-basin. The occurrence of a red and green marl in the upper part of the Rhætic group at Coity, near Bridgend, and onwards to near the famous old Pyle Inn, is significant as showing the local continuation of conditions akin to those of the Keuper Marl in the Rhætic period.

Fossils of Rhætic character have been found in the passage-beds between the Red conglomerates and Lower Lias of Skye. More important still is the discovery of Rhætic fossils in the island of Arran. Here the beds which have yielded the specimens are not actually *in situ*, but are enclosed in a coarse conglomerate that fills a volcanic vent, probably of Tertiary age.

In the accounts of Lower Cretaceous rocks mention is made of fossils obtained from the Sandgate Beds, near Midhurst; and in the records of Tertiary strata there are notices of new fossiliferous localities in the Reading Beds, London Clay, Bagshot Sands, Bracklesham Beds and Barton Clay of Hampshire.

Among the Tertiary igneous rocks of Skye much new information has been obtained. The gabbro is described as consisting of numerous distinct intrusions in the form of wedges, sheets and tongues. In the basalt plateaux west of the Cuillin Hills the salient features of the slopes are due to the numerous hard intrusive sills intercalated among the softer lava flows. These latter are in general amygdaloidal. References are made to other and later sills which differ from those which follow the bedding-planes of the lavas.

Glacial drifts have received much attention in various parts of the country. Perhaps the most interesting result obtained is that having reference to the sequence in the Gower promontory of South Wales. Evidence is given to show that the deposits holding the Pleistocene fauna in the caves are newer than the raised beach, and that these bone-beds are overlain by the glacial drift.

Of special petrographical work the descriptions of the volcanic rocks of the Exeter district are noteworthy. The results of a further examination of olivine-monzonites from Argyllshire are also stated. Analysis is given of a manganese deposit of Culm-measure age at Hockworthy in Devonshire.

Of palaeontological work mention should be made of the detection of phosphatic nodules with traces of probable cell-structure in the Torridonian rocks of Ross-shire. A useful catalogue is also appended of the Eocene and Oligocene type fossils which are preserved in the Museum of Practical Geology.

NOTES.

THE following Fellows of the Royal Society have been recommended by the president and council of the Society for election into the council for the year 1900, at the anniversary meeting on November 30. The names of the new members of the council are in italics. President: *Sir William Huggins, K.C.B.* Treasurer: Mr. A. B. Kempe. Secretaries: Sir Michael Foster, K.C.B., Prof. A. W. Rücker. Foreign Secretary: Dr. T. E. Thorpe, C.B. Other members of the council: *Prof. H. E. Armstrong, Mr. C. V. Boys*, Dr. Horace T. Brown, Mr. W. H. M. Christie, C.B., Prof. E. B. Elliott, Dr. Hans F. Gadow, *Prof. W. M. Hicks*, Lord Lister, *Prof. W. C. McIntosh, Dr. Ludwig Mond*, Prof. A. W. Reinold, *Prof. J. Emerson Reynolds, Dr. R. H. Scott, Prof. C. S. Sherrington*, Mr. J. J. H. Teall, *Sir J. Wolfe Barry, K.C.B.*

THE Royal Society's Medals have this year been adjudicated by the president and council as follows:—the Copley Medal to Prof. Marcellin Berthelot, For. Mem. R.S., for his brilliant services to chemical science; the Rumford Medal to Prof. Antoine Henri Becquerel, for his discoveries in radiation proceeding from uranium; a Royal Medal to Major Percy Alexander MacMahon, F.R.S., for the number and range of his contributions to mathematical science; a Royal Medal to Prof. Alfred Newton, F.R.S., for his eminent contributions to the science of ornithology and the geographical distribution of animals; the Davy Medal to Prof. Guglielmo Koerner, for his brilliant investigations on the position theory of the aromatic compounds; and the Darwin Medal to Prof. Ernst Haeckel, for his long continued and highly important work in zoology, all of which has been inspired by the spirit of Darwinism. Her Majesty the Queen has been graciously pleased to approve of the award of the Royal Medals. The medals will, as usual, be